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Governmental Agricultural Policy and its affect on Population Health

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Abstract:

In this paper I attempt to establish a link between government agricultural policies of subsidies and the increasing obesity epidemic that is seen across the globe. I attempt to design a research project that explores these dynamics and uses three distinct regional areas for comparison. In this paper I compare the United States, the European Union, and Japan and South Korea to see if government agricultural policy as well as trade implication play a role in rising body mass index (BMI) and obesity. The reason for comparison is due to the level of development coupled with a unique comparison of different food cultures and historically different food cuisines. This allowed me to try and measure the impact of subsidy policy as well as the role of trade implications in affecting the diet and health of the resident population. This study was an attempt to bridge the gap between agricultural policy implications and the affect on BMI and obesity as current research has only hinted at such implications. I conclude by exploring the significance of my study's findings as well as elaborate on the shortcomings of this type of investigation and the implications for future research surrounding this topic.

Introduction

Since the beginning of the 20th century, governments across the world began to engage in the practice of subsidizing commodities. This form of government policy led the creation of payments to farmers in order to maximize certain crop production. This was seen as in inevitable step in order to feed the world with an ever-increasing population. Earl Butz was the first secretary of Agriculture to alter the new deal programs created under Roosevelt to support farmers and to manage over-production (Pollan). Earl Butz's new system focused on eliminating the rapid increase in food prices as a result of the 1970's oil crises. In order to do this, Butz created a get big or go home mentality that lead to the destruction of many small farms as large monoculture plantations on large acre farms were now becoming policy and was encouraged by the federal government (Pollan). This large industrial scale agriculture model was efficient at producing cheap food, however there are many externalities associated with this inexpensive food. One externality that is believed to result from our farming system is obesity (Pollan).

No doubt government policies elsewhere were modeled from similar problems to increase agricultural production through subsidies and monocultures. Using more "efficient" means of production were becoming the new norms for global agricultural policy (i.e. the green revolution in India) while the dietary and health impacts were little known or well understood (Shiva).

Flash-forward to today and we find parts of the globe engulfed in a global obesity crisis (Swimburn). This is not an accident, many changes since the 20th century has occurred and our modern day lifestyle is completely different. One aspect that has greatly changed is our food system and food policy, which has diffused to other developed governments across the world. This change could be a possible explanation as to why humans in more developed countries are

becoming obese and are being diagnosed with the slew of health effects as a result, such as heart disease, cancer, type 2 diabetes, and other chronic illnesses (Hawkes). Food and our food systems have recently become under scrutiny for causing the global epidemic. Changes in the food system and how we eat are now receiving more research and investigation than ever before, as human nutrition is now being paid attention to more closely, with recent studies investigating our food system, policy, and dietary impacts (Story et. al).

The question that this paper seeks to investigate is if modern agricultural policies of subsidies, which is assumed will encourage specific monoculture crops, will increase crop production of such crops and effectively alter the market (by targeting such crops). For example, it assumed that certain crops would be targeted for their economic efficiency for production. In an industrial model, specialization, centralization, and simplification are necessary in order to produce such large amounts of standardized commodities. This is why a select few monoculture crops are assumed to be encouraged as a result of this model. This will affect the dietary choice of the residents as a result (due to the lack of diversity grown by farmers) and thus reduce the likelihood of the resident population to be able and receive the proper nutrition (more products will contain the same few ingredients). Altering the human diet to one of similar food crops with less nutritional quality for quantity and disregarding diversity in the diet in order to supplement an essential diet for a person is thus increasing the global obesity crisis (Hypothesized). In order to address this problem, the nutrition and the holistic health of the environment and the people must be factored in when decisions regarding agrarian policy are made at a national as well as international level.

Literature Review

The purpose of this study is to answer the question if agricultural farming practices and policies contribute to negative health consequences, such as a rise in obesity, amongst a country's population. Once countries adopt agricultural polices that favor quantity over quality, industrialization will take place and traditional farming methods will be supplanted and globalized altering these methods. The change in system will result in different agricultural systems and different food produced with altered nutritional content that was previously consumed. This rapid change and alteration will cause residents to consume food that is less nutritious and suitable for their needs as the industrial model does not take into account nutritional content or quality, bushel per acre is the common saying that drives production, so it is quantity that the industrial farmer and system is after. The costs of increased health problems are then externalized and passed on to the consumer who pays the true cost for the production of large quantities of cheap industrialized food. Industrialized food consists of large farms and monocultures, meaning a few select species that are hybridized (conventionally bred or genetically modified or altered) for simplicity, reproducibility, and standardization. That is how the industrial model keeps cost down, coupled with the generous subsides that large agribusiness companies have been able to receive from governments across the world (Pollan, Reichert). There has been great inquiry into this question already as many other researchers have pondered this question and have studied particular countries to see how diet and food relate to health (Pingali, Hawkes, Story, Swimburn etc. al). Throughout the analysis of previous literature, prior research and studies emphasize that agricultural policy is a possible link toward the obesity crises. However, the previous research never fully quantitatively tests the farming system and obesity to establish the link, instead they use more qualitative analysis and base the research on

assumptions. They propose ideas that diet change is related to changing food and altered food systems, however, they never identify monocultures or specifics within production that is leading to this cause. Local drivers like access to farmers markets and poverty are examined as reasons for obesity. They briefly touch on the farm system by mentioning farmers' markets, however, they never investigate the industrialization and mono cropping that is contributing to the obesity epidemic as externalities are passed onto the purchaser. Industrialized agricultural models are completely ignored, but it's impossible to ignore them when referencing farmer's markets and access to local foods. As national and international policy often tends to favor industrialization over localization which contributes to less access to local foods as subsidies and regulations favor big farms, mass processing, and large standardized qualities of genetically identical products (Pollan, Downey and Strife). Often, previous research has been focused on resident education, location to grocery stores, access to farmer's markets, and class and race as culprits to the obesity crises. All undoubtedly could be contributing to the obesity factor in the United States. However, this project will attempt to link monoculture production (industrialized mass production of corn, soy and wheat) and agricultural policies as a driver of obesity due to the fact that monoculture production will be assumed to increase large swaths of cheap, lower nutritional food (such as high fructose corn syrup, byproduct of mass produced, abundant, corn) and as a result, increased consumption by the general population resulting in an increase in obesity. The goal of this paper is to shed light on this question and attempt to add more quantitative analysis and evidence to the current research.

Previous literature has focused on subsides of junk food, eating environments, socio-economic factors, trade, and cultural shifts and practices (Drewnowski, Kagawa, Powell, Story). These studies have hinted at changes within food supply and diets. They have suggested policy

approaches such as education, taxing sugary soft drinks, as well as other proposals to limit bad behavior. However, most of the literature has not quantifiably focused on the farm system itself and if farm subsides coupled with propelling a monoculture food system has ultimately impacted the diet quality of the residents. Michael Pollan does so empirically in *Omnivore's Dilemma* however, it is never quantifiably tested.

In addition to domestic policies and crop production as a reason for driving obesity, the project also attempts to explore the impacts of trade and the affects that exporting and importing monoculture crops within a region has on obesity rates as well as determine if a region grows large amounts of monocultures or a diversity of crops and whether or not that region actually consumes those crops or exports them on the global market. The assumption is that subsidies increase the amount of a few particular crops grown, if many countries adopt similar policies growing similar crops, then this over proliferation of crops is going to reflect on the global market and cause other countries to adopt trade policies that import these crops affecting their residents food choices and homogenizing the global food system. Globally, countries are ever increasingly signing on to the World Trade Organization's Agreement on Agriculture to become part of the global trading network supported by wealthier nations. Globalizing trade is resulting in countries to forcefully accept these monoculture imports in order to participate in the liberalized market and is becoming an efficient dumping ground for wealthier positioned countries to leave their excess monoculture surpluses (Downey and Strife). Thus, residents' diets across the globe are altered in order for their country to be accepted in the international structure of free trade.

To begin a more in depth review of the literature, I'll start with historical focuses on the obesity crises. Benjamin Caballero, researcher, writes:

> Historical records from developed countries indicate that height and weight increased progressively, particularly during the 19th century. During the 20th century, as populations from better off countries began to approach their genetic potential for longitudinal growth, they began to gain proportionally more weight than height, with the resulting increase in average BMI. By the year 2000, the human race reached a sort of historical landmark, when for the first time in human evolution the number of adults with excess weight surpassed the number of those who were underweight.
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> Caballero continues:
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> An influential proponent of improving health and nutrition of the working class as a means to improve overall economic productivity was Boyd-Orr, who later became the founding director of the Food and Agriculture Organization. A major initial goal of this organization was to increase the availability of low-cost calorie sources, primarily edible fats and sugars. Over the following decades, these efforts indeed led to major increases in the availability of dietary energy (Caballero).

The article attempts to establish the baseline for why we see obesity in the world today and why it is so prevalent. It attempts to increase our understanding of the changes to our food system and how the powers that be changed the diet for industrial revolution purposes and to increase the size and strength of the working class in order to increase production. This study links bodily changes and diet changes together, making the claim that diet can affect the structure and health of an individual. However, this overview doesn't cover the transformation of the farming system and how, policy wise, it was transformed to change the diet for individual residents that results in our current system we see today. This is where the project attempts to explore the policy links between the farming system and governmental policy. I'm specifically

targeting subsidies to determine if it is this policy that is detrimental to the production of nutritious food that is needed to adequately feed the population better calories in order to help suppress the global obesity crisis.

Researcher Susan Cassels, has explored the question of how colonialism impacted the local diets and food production systems. Her article examines colonial rule and the impacts that colonialism had on diet and agricultural production changes in Micronesia, small island chains near Taiwan and Japan. Cassels writes, "Many have studied the role of modernization in dietary change and obesity in the developing world. These studies have suggested that rapid changes in diets resulting from modernization (i.e. improved standards of living and continued development) and market globalization have had a significant impact on the nutritional status of populations." (2). Susan continues, "Some work has shown that modernization is associated with increased consumption of salted and processed foods and animal foods higher in saturated fat, and decreased consumption of complex carbohydrates. Increased reliance on imported foods rather than traditional foods are also associated with modernization" (3). This study is especially interesting to my project because it outlines how a change in government and policies affected the overall health of the island chain. As her results suggest, "Thus, traditional diets changed slightly with Spanish, German and Japanese influence, but there was little evidence of malnutrition until the American occupation" (4). The American influence caused Micronesia to rely on imported food from the United States that increasingly became cheap and affordable for the local residents. This caused a change in the local diet with an increase in sugar and sweet foods being consumed by the local population. The food aid from the United States was actually counterproductive as it made local food more expensive and encouraged the consumption of other non-native imported products.

Obesity skyrocketed under American rule and it could lend insightful information as to how policy in the west differs in regard to agriculture and food production. Her article also explored the possibility of trade and how that has impacted diets as countries become more reliant on food imports. The growing obesity crisis may indeed be linked to farming policy and subsidies. The Micronesia example sheds insight onto the possible link between food subsidies and nutritional integrity of food as it highlights the change in food sources with the rise in obesity. However, it was interesting to gauge the impact and the effect of trade on the health of the population as well. Trade with the United States was the downfall for local Micronesian food sources as the residents became more reliant on cheap imports. Cheap imports caused the local diet to become expensive and lured the local population away from their traditional foods resulting in an increase in obesity. Trade may play a large role in determining people's food supply and access to local, nutritious, and healthy foods. This coupled with agricultural subsidies in western countries may be increasing the amount of monoculture production resulting in increased trade (of the monoculture grains and their food byproducts) abroad.

Adam Drewnowski, another health policy researcher, has explored the impact on food price and the impact that it has on obesity. As he writes, cost and income play a large factor in the obesity epidemic. Drewnowski states, "The highest rates of obesity occur among population groups with the highest poverty rates and the least education" (6). Lower incomes and a lack of education are correlated with a higher risk of being obese and significant health factors because healthy foods are more expensive and people who often tend to be poorer may lack proper education regarding nutrition, due to educational opportunity, as they are striving to survive and get by on the little income that they have disposable for food. Unfortunately, at quick glance, his articles seemed to only focus on price and ways in which we could either make unhealthy food

more expensive or educate people on buying better food and making better choices. The articles never seem to explore farm policy and how monoculture production and the agricultural system are linked to cheap food prices. The solutions and ideas presented within his articles solely focus on the demand side rather than on agricultural production and commodities supplied. This is where I hope this research can step in and fill the gap to provide better information to food policy researchers about the impact of subsides, trade, and food consumption. The farming system and policy seem to briefly be mentioned in research articles as an underlying theme but never the focal point for most of the current research that has been published and is available today.

However, Steven Gortmaker, has stated that it has to be a multifaceted approach to the global obesity crisis. It has to attempt to tackle the root causes of obesity though food policy failure, healthcare, and prevention of obesity. As Gortmaker mentions, "The changes needed to reverse the epidemic will likely require many interventions that span multiple levels and are sustained for many years. These include individual behavior change, setting change in schools, homes and workplaces, and sector change within agriculture, food services, education, transportation and urban planning" (2). His article attempts to point out that we need to do more than just food policy in order to prevent obesity. His article should lend good qualitative arguments to this research project as he stresses in the article that food policy must be changed in addition to a multifaceted approach in order to improve the food environments for people. This gives further credence to this research project that subsides and trade policy could alter or change the food produced or consumed in a country. Changes in domestic agricultural policy coupled with changes in trade structure and policy may be what's needed as a multifaceted approach to solving the growing global obesity crisis.

Correct subsidies, (or subsidies that encourage food diversity, a 'polyculutre,' and local traditional sources) could encourage healthy food and eating environments in order to alter the current trend while also encouraging local consumption reducing the need for global food imports. Although my project does not specifically focus on the correct subsidies that should be adopted specifically for each country and region, the analysis will attempt to explore the connection of monoculture crops and obesity. Monocultures are assumed to decrease nutritional content due to the fact that they are being used in order to increase production efficiency. Monocultures are a part of the industrial model and are used in such a manner to standardize production and increase the bushels grown per acre. This economic efficiency does not take into account human health or the consequences of consuming similar standardized food products. This industrial thinking of increasing bushels per acre ignores the nutritional content and the externalities that are created as a result of our food system as it is only thought of in economic efficiency of production per input cost, not efficiency in regard to healthfulness or the consequences of such production and consumption. As agriculture has become industrialized, industrialization has altered the way in which crops are grown and produced within a region. Instead of small farms that aim to feed local populations local varieties and diets, industrialization has turned agricultural production on its head and has resulted in a division of labor, inputs, and ever increasing large acre "farm" to maximize "efficiency." An ever-increasing, large-scale farm means a more streamlined and simplified process in order to increase production. Thus, selected limited varieties of crops are needed in order to maximize efficiency resulting in a decrease in nutritional choices for the population.

Corinna Hawkes explores the effects on globalization of agriculture worldwide. Hawkes looks at the changes in agri-policy and the changes in food policy as a result. As Hawkes notes,

"Moreover, by radically altering the nature of agri-food systems, globalization is also altering the quantity, type, cost and desirability of foods available for consumption" (2). Her main example points to vegetable oil. As monoculture production has spurred the production of rapeseed, corn, and soybean oil to be used as a common cooking item. This has lead to an increase in consumption worldwide as global agricultural trade policies encourage the production and trading of vegetable oil while at the same time global food marketing is on the rise convincing consumers that this oil is healthy and needed in their daily diet. Thus homogenizing the global diet through agricultural production and marketing. This previous research will be important as it provides insight regarding the impacts of globalization and trade. I hope that my research will provide a quantitative link between a countries agricultural subsidy system and the proliferation of similar food products on the global market for trade as well as determine if a region consumes it's own agricultural products. This could provide further explanation of how trade could be affected by food subsidies and that a change in subsidies on the domestic level could potentially have an impact on the global agricultural trade that in turn affects obesity.

Continuing the discussion surrounding trade and globalization, Yasuo Kagawa, explores changing diets specifically in Japan. As he writes, "The traditional Japanese diet changed dramatically between 1950 and 1975: the intake of milk (15 fold), meat, poultry and eggs (7.5 fold) and fat (6 fold) has increased, while that of barley (1/40) potatoes (1/2) and rice (0.7) has decreased. This westernization is more pronounced in the younger generation, rich people, non-farmers and city dwellers" (205). His research investigates the physical characteristics of the population and gives us data as to how Japanese have become taller and heavier over time. As a result of the introduction of a western diet, certain cancers (breast, colon, and lung) and other diseases have increased 2 to 3 fold while others have decreased slightly (stomach and uterus

cancer). Those who have more traditional Japanese diets are smaller and live longer compared to other parts of the population that are larger but live shorter lives due to diet changes. This previous research is useful for this analysis, as it will help further the connection between diet trends and the impact on health. This research demonstrates that a change in food products can alter peoples' health as consumption patterns change. Useful information, which can further make the connection between subsidies and the ultimate impact that it, has on residents' health. This paper was one of the first to measure the actual physical change of people as a result of diet change through westernization and value changes regarding diet. Hopefully, this project can add to this and further the connection between the subsidies, domestic production, and the consequences for world health and agriculture as a result.

Finally, Derrick Yach, points out the problems and consequences for not dealing with the global obesity epidemic. His research paper looks at how strategies to stop or mitigate the global epidemic have been minimal. This paper looks at the consequences that could happen if nothing is done to prevent the crises from worsening. The improvement in life expectancy will be reversed, and the economic impacts will be felt. As Yach states, "But in recent years, additional risks, epitomized by the global rise of overweight and obesity, and the resulting impact on diabetes, cardiovascular disease and certain cancers, have become prominent. About 1 billion people in the world are overweight or obese, compared to 850 million who are underweight (62). Yach continues with the most striking statement, "Overweight and obesity have become to diabetes what tobacco is to lung cancer" (62). The paper warns that economic causes and incentives condition people to want the unhealthy choices (promotion of western agricultural policies such as subsidies, centralization, specialization, monocultures, and food advertising and packaging) are causing these problems and should be changed by government policy, for good

reason, as there is a huge cost associated with obesity for both society and the individual. This relates to my project because if I am able to link agricultural policies of subsidies to monoculture crop production and poor health, as well as link it with an increasing proliferation of monoculture crops and the western diet in global trade, then I can offer possible solutions to combating the global obesity crisis on the production side of agriculture. The research and the structure of the analysis can offer valuable information in the field and allow further discussion of possible solutions in regard to agricultural policy, if my hypothesizes are confirmed (discussed below).

Overall, these researchers and their articles offer good background and good guidance for determining how to approach this research project. Hopefully, this paper will be able to add valuable insight in regard to the agricultural policy and subsidies, trade, and the health affects that a monoculture food system supported through subsidies can have on a country's resident population.

Research Hypothesizes

Two hypotheses will be under main investigation in this study. The first hypotheses is the international hypotheses and states: if a country imports large amounts of monoculture food crops (defined as importing half or more of crops produced by a monoculture; whereas monoculture crops are defined as largely grown amounts of the same food crop, such as corn, soy, and wheat), their residents rate of obesity will increase as well as the detrimental health factors associated with obesity. Crops such as corn, wheat, and soy are the major mono-crops available today for a variety of reasons and will be the central focus of this study. Mono-crops such as corn, soy, and wheat are produced for a variety of reasons, they provide the feed for

animals, alternative corn ethanol and biodiesel fuel, as well as contribute to a wide array of new food products made exclusively from those crops such as xanthan gum, gum guar, citric acid, high fructose corn syrup, soy lecithin, bleached white wheat flour, soy protein powder, and etc. (Pollan). These crops are produced exclusively for the wide variety of products and materials that they can be turned into. From an economic standpoint, this manufacturing of a multitude of products is genius as it increases the uses and profits of an ever-abundant supply of corn, soy and wheat. The mass production and standardization of all three products means that diets are becoming incredibly similar across the globe as food traded is processed with these similar staple foods due to sheer abundance and over production. The corn, soy, and wheat have to be used somehow and fancy new consumer food products are born that include one of the three most common monoculture crops. Therefore, there sheer abundance in production across the globe will cause massive trade changes as countries have no choice but to trade their monocultures globally due to the how cheap they can produce them domestically as a result of subsidized policy and specialization, centralization, and monocultures, which greatly increase the amounts of crops produced per acre of land.

This hypothesis is going to be used in order to test the effects of trade on countries and residents diets. As previous research pointed out, the globalization and proliferation of the western diet across the world is drastically changing the health of people abroad. This will allow the investigation to test for trade and how countries interact with each other in order to determine if trade (imports and exports), in regard to agriculture and food has an impact on the residents' obesity rates of a country/region. Using data from the UN Food and Agricultural Program (FAO), allows for easy access to import and export data, which will help gauge target regions agricultural trade and behavior to determine if they are having an affect on obesity. It is not

impossible to imagine that a country could grow large amounts of fruits or healthy food only to export them on the global market and as a result their residents consume less healthy food. Also, it could be the case that a country has poor land quality and can only produce so much. Maybe a country will rely on imports in order to cover the calorie deficiency and in turn import what the markets have available. If countries across the globe have switched their domestic policies to include subsidies which in turn increases monoculture production, then it is likely that we will see more similar food products on the global trade market. Thus, countries that rely on imports will be subject to a saturated global market and import these monoculture crops changing the health of their residents by increasing obesity rates. The international trade aspect is designed to control for these external factors besides solely focusing on domestic features of food policy and production. In this way, the design will be able to control for other factors that could affect the domestic food consumption, such as a country exporting most of its fruits and vegetables that it grows to the international market. The international hypothesis is designed to monitor for this variable and make sure that those living within a country are actually consuming more of their own agricultural products that they grow. For example, if Japan and South Korea grow a lot of vegetables and fruits, yet export a larger amount that is grown on the world market rather than feeding their residents, then it is assumed that the people will be deprived of their own domestic production and could possibly alter their diet by making them reliant on imported food from other nations, thus increasing obesity.

The next hypothesis that will be tested will be focused on domestic agriculture policy and their effects on food and health. The domestic hypothesis: if a country's agricultural policies support subsidies for food production, the more similar food crops will be grown and monocultures will occur. Affecting consumer choice and resulting in less abundant, diverse, and

nutritious food sources and an increase in obesity amongst the population creating health problems associated with obesity.

This hypothesis is designed to test for crop subsidies, and how they affect the agricultural production of a nation. The reason for testing for subsidies is that typically, at least applied to the United States, food subsidies have largely been crafted to encourage large production of corn, wheat, and soy crops for food products. The EU is fairly similar in their subsidy program or common agricultural program (CAP) in propping up monocultures and supporting corn, wheat, and soy production, although they vary with different regulations regarding the environment and public health (Reichert). Japan and South Korea are similar in that they have promoted larger and larger farms with an industrial model at the base of production, while they don't typically subsidize the exact same crops with rice being the standalone difference in production (OECD report). This study is designed to measure the impact that subsidies, in general, may have on food crops and how in turn that affects domestic crop production, which creates lower food prices for less nutritious food. The underlying assumption is that monoculture production overproduces certain commodities that lower the price of food. The excess commodities, which are cheaply priced, are used for processing and are manufactured into packaged food products that wind up on grocery store shelves. Thus, delivering less nutritious food to residents that all resemble similar key ingredients such as corn, soy, and wheat. The key measurement here will be if agricultural subsidies have led to an increase of monoculture crops as well as increased production. If it turns out to be significant, and that countries tend to have a higher obesity due to agricultural subsidies and increased production, a further project may be needed to investigate, specifically, the types of subsidies these crops are going to and if the obesity rates are correlated with an increase in production of those certain crops. Then we may know further whether or not

subsidies could be arranged in such a way as to encourage diverse food crops and products to lower the BMI of a population and as a result increase the health within a country or region. However, this is not the scope of this project and the design only attempts to investigate whether or not there is a link between food crop subsidies, increased monoculture food production, and obesity rates to establish the initial link. The study does not specifically designate certain crops as monocultures, (i.e. corn), because the term monoculture refers to large amounts of similar crops grown, which could be anything, for instance bananas could be grown in a monoculture. Monoculture does not designate a specific crop but designates large crop production of similar crops to constitute a monoculture.

Research Design

The design of this project will test a host of different countries and/or regions across the world. This study will examine the United States, the 28 member EU states (averaged as a region), and Japan and South Korea (averaged as a region). In order to test the hypothesis on international trade, import and export data will be used in order to determine if international markets and globalization are affecting BMI. This research project is interested in the average data sets as a whole in terms of obesity in each region and accesses complete data sets on trade (import and export) that reach from 1980-2009. The reason that the data set runs from 1980-2009 is simply because the data is hard or incomplete amongst international countries and regions. It was also difficult to find complete BMI data sets that were tabulated in the same method after the year 2009. Therefore, a recent specific time frame had to be established in order to have consistent data throughout the design. Import and export data will be measured be using data from the UN FAO data set. Import and export data was measured by the top five agricultural

commodities determined by metric tons. The FAO data contains a list of the top twenty commodities traded by value and quantity. This research project uses data quantified by quantity instead of value and qualified only the top five imported or exported crops to be included in the data analysis. The reason for this was mentioned earlier but includes the assumption that industrialization is beginning to take effect across agriculture and spread globally. Industrialization means specialization and specialization means making agriculture more efficient in dominant economic theory by simplifying agricultural production that can reproduce the same crops year after year with complete standardization of the commodities. It is similar to how Coke sells their soda. Every bottle across every store in the country and world is designed to taste the same. This is now similarly being applied to agriculture and crop production where corn, wheat, or soy grown in Iowa or Missouri will be identically the same in content from Colorado or Kansas and similarly across the globe (Pollan). Hybridizing and reducing the types and varieties of crops makes this process much more simplified for food processors and packagers. Therefore, it will be reflected in agricultural trading patterns across countries and regions as domestic agriculture begins to produce fewer varieties for production purposes. With this being common amongst the United States and European Union, it assumed that there domestic agricultural production could affect trade and as a result, the top five imports and exports would be sufficient enough to gauge the impact of monocultures, trade, and the rate of BMI. The study will aim to research the impact and changes that occur over the twenty-nine year period and measure how the crops traded changed, the amount, and the rate in which BMI was affected.

Originally, the research attempted to gather subsidy data to determine if there was an effect from the change in subsidies that altered the structure of crops grown that encouraged

more similar crops and monocultures. However, unfortunately, data collected that was associated with the 1980-2009 time frame did not include any changes. The countries were recorded to have had subsidy programs from 1980 onward. The effect of no change meant there was nothing to explain for this study. The time frame made it so the original idea of capturing subsidy change as an effect on BMI and obesity was not possible. The limitation was a handicap that made it impossible to look any further into previous years' policies. The late 1970s and the early 1980's began a new era of farming policy in the United States and across the globe. Earl Butz, the Secretary of Agriculture under Nixon promoted bigger farms, monocultures, and reductionist science (applying artificial fertilizers, pesticides) to promote monoculture plantations across the United States. He also encouraged the spread of these policies to other countries through his assistance in helping promote these methods in trade agreements and global agricultural policy (Pollan, Downey and Strife). This important shift was left out of the research due to the international limitations. Unsurprisingly, this did not reflect a change and therefore disabled the study to speculate on subsidy policy as a driver in BMI and obesity. Although it will still be assumed and be used as an underlying assumption that is causing altered production, the study can no longer research that shift in agriculture subsidy policy and its complete effects on BMI and obesity. If countries and regions show that crop monocultures have remained similar over the twenty-nine year period and production has steadily increased, it will be assumed that subsidies are underlying that production increase as well as maintaining similar monocultures. Normal circumstances and unaltered production would lead to different varieties and different production if it was not for subsidies and guaranteed money that supports specific crop production. The toll that constant similar production takes on the soil and environment requires large inputs of fertilizers to maintain production (Pollan). Constant similar production could not

be maintained because of the cost to farms and farmers without the aid of government subsidies. The reason for this is that it costs the farmers more to produce the corn that they actually receive in return when they go to sell it. Therefore, farmers would be losing money and subsidies are a guarantee by the government to pay the difference in the amount that's lost when they sell it on the market (Pollan). Without subsidies, farmers would have to shift production and rotate crops that would better support the soil while also producing seasonal diversity of food for humans as well as livestock (Pollan).

Since crop production has not changed drastically from the 1980s (meaning that subsidies have continued to encourage the same crops to be produced and that there has not been a drastic change in agricultural policy that alters these subsidies), the assumption that subsidies are still affecting production continues to play a role even if a specific subsidy policy shift can no longer be shown. The research is no longer allowed to quantify these changes.

The next data set that was included in the research was the crop production data sets. Following all my other variables, the production data will include a time frame of 1980-2009. For similar reasoning, only the top five crops produced in a country were recorded in the data. The crops produced were recorded from the UNFAO data set and were ordered by the amount produced in metric tons. The top five crops produced and their amounts were recorded and analyzed in the regression. The reason behind only including the top five crops produced was because of the assumption underlying subsidies and production. If farmers are now going to be paid for production of certain crops it makes sense that farmers are going to want to increase their production in order to continually make profit, especially if commodity prices are low. The government will essentially guarantee a price for farmers in which they can be paid. This gives farmers an incentive to increase production and continually grow their farms. This continual

increase is recorded in the data and will result in the same crops to be encouraged to grow annually while continually demanding higher output.

Although subsidy changes will no longer be measured in the analysis this does not mean that monoculture crop production cannot be linked to an increase in BMI and obesity. The study will be able to test and measure for a change in production and the resulting effect that it has on BMI. The underlying assumption will include that people's consumption of similar food products increase as the crop production increases. As a result of the industrialization of agriculture, food producers want guarantee of an efficient production. Efficiency in agriculture means simplifying while also extracting the most out of your production. As production of similar food crops increases, producers are lured to make an increasing line of food products that have similar ingredients. Consumers at the store no longer have complete control in what they want to eat if they have restricted budgets. Also, less aware consumers may unknowingly purchase or not care due to price, convenience, and advertising. Processed or packaged foods contain similar food ingredients produced from monocultures as they appear in every new food invention (i.e. pop tarts). However, consumers may chose to purchase less processed foods if they are more aware, educated, and open to eating less processed foods, although those numbers are assumed to be smaller in the overall population, due to cost.

Although it may look, taste, and smell different, underneath it all, it has similar ingredients. These ingredients, because they have been chosen for efficiency and not for health or other reasons mean that food products are not geared toward complete nutrition. Empty calories litter the store shelves pleasantly enticing shoppers with colorful packaging and phrasing. All selectively printed and designed in order to catch the shoppers' eye and in turn escalate food producers' profits. These assumptions are key for this study and are well rooted in

dominant economic theory and practice (Princen). Resulting in a static population that is docilely consumptive which results in people consuming more similar food products with little nutritious value or complete nutrition. Diets have now been artificially altered due to monoculture production and industrial agriculture. The design of this project is an attempt to give additional quantitative research surrounding the subject of agricultural production and the affect of BMI and obesity.

Finally, obesity will be measured through the World Health Organization (WHO) average BMI that spans from 1980-2009. This data will include an averaged men and women's BMI from ages 18 and older. I have collected the average BMI for the US, the twenty-eight EU member states (averaged as a region), and Japan and South Korea (averaged as a region). Regionally comparing the results was easier to interpret as well as streamline with the other data variables. Because of the time frame limitations, the streamlining of data sets to match the time frame meant that averaging regions, as a whole, was more achievable for this project and allowed the research to progress. The reason for excluding more current BMI data sets from the WHO include the fact that the organization of the data has changed and logs BMI differently for more recent records. As Obesity will be the only dependent variable and will be most important to observe, it is critical that the 1980-2009 time frame be used as that includes the most consistent BMI recorded data for all three regions and is the basis for the study.

The reason for the comparison between the United States, Europe, and Asia is because the United States has some of the highest obesity statistics in the world. The European Union and European countries typically have lower obesity rates than the United States, yet recent trends have seen Europe increase in the amount of obesity amongst its residents. Japan and South Korea are included into the research project because they typically have much lower obesity statistics

than both the United States and Europe. Asia in general has much lower obesity rates in the entire world. That is why this project will be comparing the US, EU, and Asian countries of Japan and South Korea, which exemplify a low obesity rate, to determine if this quagmire can be solved. The design of the study selected both countries from Asia as they exemplify regional trends and will be a good control for level of development. Certain countries in Asia lack the level of industrial development of the United States and the EU. Japan and South Korea will be a good comparison as they both show similar amounts of per capita income amongst their residents. The reason that the design of the research includes all developed countries is because it will be easier to control for developing factors that could influence obesity, such as a rise in incomes as well as account for technology and its role in creating obesity. Although not completely perfect, the developed countries selected will help control for TV, video, vehicles, housing, wealth, urbanization, and many other factors that could be contributing to higher obesity in industrially developed countries. Including developing countries into this report would make it difficult as the project would then have to take into account increased incomes and other prospects of industrial development that could affect obesity. For this reason, the design and purpose of the study will only compare industrially developed countries to control these underlying variables, which could affect obesity rates. This should not be seen as ignoring or not caring for the rising obesity in developing countries, rather, as limitations to a global quantitative research project.

Data and Evidence

In order to construct a regression analysis, I collected data from regional sources to determine if different agricultural policies across the world (related to subsidies) would influence body mass index and increase obesity. To begin, I used data from the United States, the European Union, and East Asian countries in order to contrast the analysis. I assume that different regional values and policies would be at play and in affect change how subsidies are structured and the resulting crops grown. An increase in certain monoculture production with an increase in population and consumption is underlying the thesis that results in high calorie food to be produced with less nutritional value as the focus is more on production of calories. Also, the data analysis tested for trade and how international markets affected regional food consumption. The regression included data from imported food commodities as well as exported food commodities in order to determine whether or not the residents of each region consumed the food produced or relied on food imports from other nations. Interestingly the results were surprising and contradicted my initial assumptions on how the regression would proceed. Below is the original analysis:

R-squared = **0.7832**
Root MSE = **.9578**

(Std. Err. adjusted for **3** clusters in ccode)

BMI	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
logproduction	**1.192637**	**2.102771**	**0.57**	**0.628**	**-7.854856**	**10.24013**
logimports	**-.2695747**	**.6362315**	**-0.42**	**0.713**	**-3.007058**	**2.467908**
logexports	**1.215778**	**.3844887**	**3.16**	**0.087**	**-.4385437**	**2.870099**
_cons	**-13.39603**	**53.24229**	**-0.25**	**0.825**	**-242.4791**	**215.687**

**P value significant at 0.1%

To run the regression, I collected the data and types of the top five crops produced, imported, and exported. These are the independent variables that are being used to gauge the impact on my dependent variable body mass index (BMI). BMI is the key variable that will be measured to determine if monoculture crop production and trade play a role in affecting obesity rates. The data collected spanned from 1980 to 2009 as it was the most complete data set available for all three regions as obesity data is often relatively new and was not recorded across the globe until recently. Production and trade data was relatively easy as the United Nations keeps accurate records of food produced and traded over a decent time frame, much further than obesity. But for the sake of the analysis, production and trade data coincide with the obesity data.

It is an underlying assumption that if a country had subsidies (which all countries studied did) monoculture production would result in select crops being produced as they are heavily supported by the government. As a result, these subsidy policies create monocultures that

increase production and trade of monoculture corps across the world limiting residents' food choice and creating in increase in BMI and obesity.

These results are overly conflicting and unsatisfying as the domestic crop production variable was associated with a .628 P value, indicating with a 90% certainty, that there is not a an increase in BMI associated with increases in monoculture crop production. The coefficient indicates that there is a 1.2% increase in BMI over the course of a twenty-nine year span; however, the P value indicates that this increase has to be due to other factors. The trade data for exports offer more confusion by producing significant results. Crop exports were associated with a 0.087 P value meaning that there is a 90% certainty that an increase in BMI is associated with agricultural exports. If a region is associated with exporting monocultures on the global market, then apparently this must be altering the global food traded and consumed, affecting BMI. There is also a 1.2% increase in BMI associated with exports over the twenty-nine years span as monoculture food produced was increasingly exported on the global market, thus possibly affecting food choice and altering residents' diets.

Finally, the only variable that showed a decrease, although incredibly slight, was the import variable. The coefficient data shows that there was a negative -.27 decrease in BMI as imports of crops occurred. However, the P value shows no significance at 0.713. Meaning that this decrease in BMI is not associated with agriculturally imported substances. A possible explanation for the decrease (Although found to be not significant in this regression) could be the fact that East Asian countries readily exported many fruits and vegetables to the United States and Europe while Europe and the United States traded corn, soy, and wheat to each other as well as in East Asia. The steady import of vegetables and fruits in the United States and Europe may have offset a small percentage of the production and export increases in BMI. The R squared

value for the linear regression was 0.7832, meaning that 78% or well over half of the variation in the model has been explained. This is a good sign as the closer to 100% the better the data fits my model, however, lowers R squared numbers are not necessarily inherently bad, and even a high R squared number does not indicate a bias in my model. But there is less variation in the data collected and it seems to be pointing to a trend that globalized exports of monoculture crops of corn, soy, and wheat, are leading to a homogenized diet across the globe and an increased BMI.

In order to double check the analysis and to make sure that the results are significant, I ran another regression in order to preform a robustness check. The linear regression includes a lagged BMI dependent variable, year fixed effects, and standard errors clustered by region in order to determine if the results would hold up or not. The robustness model is included below:

```
.                                                                   R-square
> d     =  0.9998

.  (Std. Err. adjusted for 3 clusters in ccode)

.
.           BMI |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

.            L1. |   .9983291   .0041934   238.07   0.000     .9802863    1.016372

.
. logproduction |   .0153981   .0213862     0.72   0.546**    -.0766193    .107415

.     logimports |  -.0284402   .0087543    -3.25   0.083**    -.0661071    .009226

.     logexports |   .0003824   .0022406     0.17   0.880**     -.009258    .010022

           _cons |    .284573   .6192893     0.46   0.691**    -2.380014     2.9491
```

** Indicates a P value significant at 0.1%

According to the results, the robustness check was able to confirm and conflict with outcomes of the previous regression. For crop production, we see a P value of 0.546 confirming the there is no significance with 90% certainty that increased monoculture production is not associated with an increase in BMI in a region. However, as the coefficient states, increased monoculture crop production was associated with a .02 increase in BMI, but this does not mean that this increase was significantly linked with monoculture production.

Continuing, for the trade aspect of this study, imports of agricultural commodities were found to have significant impact on BMI. Meaning that a decrease in BMI was significantly associated with agricultural imports with a P value of 0.083. A decrease in BMI is found as imports increased, with a coefficient of -0.28. Confirming that there is a significant relationship with 90% certainty of a decrease in BMI as imports increased (Possible explanation discussed earlier). Finally, agricultural exports resulted in a .0004 increase in BMI as monoculture crops were exported onto the global market. This was coupled with a P value of 0.880 that confirms that there is no significant relationship with 90% certainty. Although BMI increased very slightly as exported crops increased, these results suggest that something else must be at play causing this occurrence. Once again, the robustness check allowed of more confusion and made the discussion less clear as far as the results. Limitations to data access may be playing a role, which have altered the quality and insight of this study. Further discussions will proceed after the data analysis.

Finally, to conclude, the R squared value was a strong .9998 meaning that almost 100% of the variation in the model has been explained. The data (available) fits the model well and the robustness check serves as an important check in making sure to eliminate variation that could be influencing BMI throughout the regression, however, the results offer a confusing puzzle which makes the overall conclusions of this study less impactful or insightful as first hoped.

The regression model was able to confirm and deny a part of both my original hypotheses. First, the regression was not able to confirm my domestic hypothesis that an increase in local monoculture production would result in an increase in BMI in the regional resident population. Unfortunately, as a result of the data, we remained as far removed as ever from understanding the true drivers of obesity. Although I still believe crop production and

agricultural systems play a role, the data included was not able to capture this complex domestic and global dynamic. Also, the important question surrounding trade and agricultural products has revealed conflicting results. An increase in agricultural monoculture exports was revealed to increase BMI in the first regression with significance, while the robustness check revealed that there is no significance with in increase in BMI as monoculture exports increase. As far as trade imports are concerned, once again we are left with an unclear picture. In my original analysis, the results found that there is a decrease in BMI as agricultural imports increase but were not statistically or clearly significant at 0.713 with a possibility of other factors contributing to the decrease. Strangely, the robustness check also found that an increase in agricultural imports was associated with a decrease in BMI but this time was statistically significant with a P value of 0.083. Meaning that apparently importing monoculture crops will decrease BMI. However, a problem with this could be how monocultures are defined within the study. For example, if countries in East Asia are growing monocultures of healthy foods (cabbage, broccoli, etc) and exporting them to the EU and the US then it could very well be slightly decreasing the BMI, although overall, the increase in BMI is still greater when averaging in the increases. The conflicting results can probably be attributed to the design of the study and the way in which the project had to be altered to accommodate the data.

Conclusion

This study was able to provide interesting and confusing results that have begun the discussion regarding agricultural policy, monoculture crops, and the connection to obesity. Global agricultural trade is still questionable as a possible factor in influencing the increasing obesity rates, as the P-value was found significant with exports in the first regression. While the

second robustness regression provided significance with a decrease in BMI associated with imports. Domestic agricultural production appeared to not play a role in an increase in BMI as the P-value was insignificant each time although the P-value did decrease in the robustness check. The results do not provide clear answers and we are still left with this question and puzzle for further research. However, this study has been able to break new ground by being the first to explore this connection. Never before have researchers attempted to explore this link and attempt to do so in such a global and cross-national scale. It is an encouraging first step and I hope that this study could possibly lead to further research in the future regarding our agricultural systems, trade and the health impact that contributes to obesity. There are many more possible variables as discussed earlier that could be possibly affecting human health and changing our diet. Limiting factors regarding data and design may also be contributing to the conflicting results. The partial BMI data records and shortened timeframe altered the original design, possibly contributing to different outcomes. Future research will have to take into account this study's limitations and try to correct for them. This research is not modest and will require additional inquiry in order to untangle the complex societal interactions that are resulting in this increase in obesity across the globe. This study provides a first attempt at understanding these questions.

Further Discussion

There were some obstacles in obtaining and developing the study. To begin, BMI and obesity data were hard to gather for years preceding 1980. As obesity was declared a health crisis by the UN Health Organization in the mid 90's, it was difficult to gather international data, as most countries didn't keep records of BMI or obesity within their country. The only country for which it was relatively easy to gather BMI and obesity data was from the United States. The

United States had obesity data ranging all the way to 1964. However, countries within the EU and East Asia were impossible to find (possibly due to the fact that they haven't had a huge rise in obesity until recently due to traditional diet and food culture). This created the first problem with the data set and forced me to alter the timetable and data input. Originally, I wanted to go back at least until the 1960s, as agricultural subsidy policies were structurally different, especially in the United States. The original question of this study was to determine how agricultural subsidies and changes in structure (which crops are encouraged to grow) altered obesity and actually increased it. By changing to subsidies that encourage large farms and few varieties, the assumption was that people will lose access to diverse diet and be forced to consume a nutrient void diet of similar food products. However, this study was not able to capture the impacts or structural changes in subsidies, as I had to begin at 1980. By 1980, the farming subsidies in the United States had changed to encourage "get big or get out" farming operations and future European Union countries were beginning to model a similar approach (Pollan, Reichert). Also, East Asian countries began encouraging rice subsidies and the current debate today surrounds the equity of those subsidies as many claim they mostly support large corporate farmers (OCED report). The absence of a thorough investigation into my original question altered what I originally was attempting to find.

Continuing with the data that I had, it could no longer truly test for the change in subsidies and the complete structural impact of subsidies as the subsidy variable would not change throughout the entire twenty-nine year span and thus was useless in what I was trying to test for. It was difficult to add a complete and listed variable of subsidies into the analysis. It became impossible through the data analysis to include specific crop subsidy analysis that could have helped yield more specific affects of certain crop subsidies, arrangements, and the impacts

as a result. It would have specifically aided in investigating the conflicting import data results with varying analyses. It would have also clarified the domestic production question and made it easier to judge the impact and shifts of certain modes of crop production to more small scale farms with different crops to larger scale farms with similar production. Therefore, as a result, I believe this study provides some insight into the question regarding monoculture crops, domestic policy, trade, and the overall impact on resident health through an increase in BMI, as this is the first study to attempt to do so. Unfortunately, the methods of this study were greatly curtailed to unify the data analysis resulting in mostly insignificant correlations. The impact monoculture crops have on obesity and how their production and trade may be affecting BMI and obesity is still an ongoing question and up for debate. Although it may have not been able to highlight the subsidy impact that I hypothesized in the beginning, the data does show some correlation of increasing agricultural exports (in addition to domestic production increases) with an increasing BMI (If exports are increasing that must mean domestic production is also increasing although it wasn't found to be significant). This is interesting and shows that there will have to be more research done in order to nail down this question. Especially in regard to subsidies and production as this study is not able to link obesity to subsidy policy and the breakdown of actual payments and structure.

With conflicting results, modified research, and an intriguing question, I imagine that leaving out subsidy data in this analysis hurt the scope and results. However, leaving them out doesn't ruin the attempt if we understand things through neoliberalism. Underlying everything is the fact that our entire modern food system relies on "economic efficiencies" in order to facilitate production (subsidies are a large part of this). Actual subsidy breakdown is important and will be an important question for researchers in the future however, the subsidy entwinement with

economic efficiencies is assumed in this analysis. Underlying this is the fact that efficiency relies on producing things in the cheapest possible way to maximize profit. In order to do this in agriculture, you decrease crop mixture and hybridize a select few varieties that can be easily produced into certain products for mass consumption (i.e. corn syrup, wheat flour, cane sugar) that can be standardized food ingredients for production in the food industry while encouraging subsidies to increase production and reduce input costs. Disregarding the need for actual crop diversity and the diversity that is needed in the human diet. It's not at all surprising then, that there could be a potential for an increase in BMI and obesity to be associated with crop production and farming systems. Even if subsidies are not taken into account, we can assume that this economic model would still follow and alter the food diet of residents across the globe. Especially as globalization continues to occur, the fact is that the new trend is toward centralization, which alienates people from a diverse food supply and historical heirloom varieties that our ancestors consumed for nourishment and instead replaces this connection with an increased supply of abundant, empty calorie choices that sustain, albeit rather poorly, the global population.

It cannot be ignored that there is a significant impact of an increased BMI on the world population, even if this analysis cannot confirm that crop production and agricultural systems are a driver. For the first time, probably in the human era, we are faced with a problem of consuming too many calories, that are dietarily insufficient, more so, and the health effects are grave. As human life and longevity began to increase throughout the 20th century, we may be faced with a stark flat line and decrease as obesity continues to climb among developed nations as well as developing. Health consequences such as heart attack, stroke, cancer, type-two diabetes, and many other aliments are a result from obesity (Yach). This decrease in life expectancy, which

decreases as BMI increases, is an ironic twist promised to us by modern day industry and economic consensus that growth and "efficiency" are what moves the world by and large, and is a good thing as prosperity is brought to all as everyone is lifted from poverty (Yach). However, the continuation of this mode of thinking, has removed the populace away from a healthy and balanced diet that fits our unique and complex nutritional needs by supplanting a cost efficiency mechanism that ignores the social costs while pertaining solely to production costs. In the end, removing the emphasis of subsidies in this project was not necessarily a misstep for the design. Although the unique question of subsidies and structure may play a role in affecting BMI through trade and production, our economic mode that encompasses the globe may be the underlying theme that is actually driving subsidy policy in the first place and is dependently altering agriculture lands and production to fit this economic model. It may not be possible to plainly alter subsidies to encourage local regional crop production, per se, as our "economic efficiency" model encourages division of labor, centralization, and specialization which seems to be incompatible with decentralization, local knowledge, and communal farming which encourages communities to overcome challenges by encouraging diversity, age old traditions, and local knowledge to overcome challenges with agriculture production.

Another factor that should be taken into account is the global trading dynamics and the centralization and globalization of our food chain. Centralization of the food supply by taking into account trade deals; global supply chains, and elite decision-making should be included into the analysis. A more complete social analysis coupled with complete subsidy data would offer a complete explanation of the global obesity phenomenon. As sociologists Liam Downey and Susan Strife discovered through their own study:

> Thus, this case study demonstrates that the social and environmental consequences of liberalized agricultural trade—greater corporate control over agriculture, increased farmer poverty, the increased mechanization of farming, reduced seed and crop diversity, and the increased use of petroleum and petrochemicals—are a direct outcome, at least in part, of economic policies devised by members of the power elite to improve their economic position at the expense (either intentionally or unintentionally) of farmers in developing and developed nations. (170)

This discovery highlights the need for a more complete integration to determine the systemic impact of elite decision-making, corporate control, and trade deal impacts. Without understanding these variables and including them into the analysis, it leaves a more simplified picture that could be further reinforced by a close examination of these factors. Although both sociologists research was in regard to environmental degradation, these variables could also be included to determine the impact on human health and how obesity has changed as a result of these factors. More corporate control of the food supply, elite decision making, and global trade deals like the World Trade Organization Agreement on Agriculture is an interesting area to explore and will add valuable insight on the impact of obesity. However, for the basis of this study, the initial link had to be established between a simplified version of trade, production, and obesity. Since the link has been established as significant, it would be worth exploring this simplification into greater detail to understand how a global complex economy coupled with top down decision-making and trade deals affect agriculture and in turn affect the health of the resident population by increasing obesity through manipulating food choice for profit. It should not concern us that this project wasn't able to answer all these questions and variables initially. It is in the hope that this initial link will lead to further research and further our understanding of

food politics and obesity. Although the absence of these factors and variables are not detrimental to this study they could greatly alter the impact of understanding our society, food systems, and health consequences if included and therefore should be seriously considered for future endeavors into this inquiry. The difference between this study and my study is that both sociologists focused on the institutional structures and power making decisions that decrease the amount of small farmers by playing them off of one another on a global market. Creating a global food system that promotes less diversity, farmers, and farms. However, the researchers never focus on the health impact that results for the rest of the population and how a change in the global food system affects BMI and obesity. They are solely focused on power structures, decision-making, and the effects on farmers and crop diversity.

Finally, the critique of the data also leads me to one more important discussion surrounding the scope and design of this project. As a social scientist, I am trying to describe complex social behavior and patterns that occur in the world. In trying to do so the requirement be that human social complexities must be transformed into data points that can be graphed, regressed, and charted. As a result, human complexities are often not reducible to data points as human behavior is often erratic or dictated by some sort of necessity and can be ordered by social structures, culture, and economic status. To reduce this complex behavior into some point that can be regressed is often difficult and can rarely capture the relationship in real life. The difficulty in designing this project goes to show how hard it is to even study the questions that we would like to investigate through a data driven model. Humans are not numbers, humans are people and people are apart of a complex global web of decisions, networks, and access. These complex interactions amongst people add to the complexity for researchers and make it difficult for these variables to be captured in data sets. Does this mean that we should ignore these results

completely, no, as they do offer some insight into the question that is being explored. However, the numbers and statistical minute increases and decreases should be taken with a grain of salt in this study. Although that seems counterintuitive, for as stated earlier, I was hoping that this study could contribute to the field of research in food policy and obesity. But I believe this study still has provided an interesting attempt to solve the question of global obesity as food crop production (aided by political structures) have been routinely ignored by mainstream research. The fact that this study begins to undertake this monumental task is a contribution in itself even if the results provided conflicting answers. As both sociologists Liam Downey and Susan Strife pointed out there are complex structures and organizations within society (such as elite decision making, trade deals, etc.) that are also causing monocultures and large farms to occur thereby possibly influencing BMI and obesity. This study does not attempt to capture all of this complexity and is limited in nature. However, it is a first step in a firstly attempted research project that studies the correlation between agricultural subsidies/policies, monoculture crops, and rising obesity rates. No research prior to this has attempted to wade through the potentially messy and complicated project that would ensue. Overall, this project begins to start the conversation and investigation into this theoretically difficult answer regarding global obesity and government policies.

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